

# RACEAMERICA

*T i m i n g   S y s t e m s*

*Model 2800P  
XL Professional  
Dual Lane Drag  
Timing System  
Owner's Manual*

Rev J

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## LIMITED WARRANTY

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To the original purchaser of this RACEAMERICA product, RACEAMERICA warrants it to be in good working order for a period of ninety (90) days from the date of purchase from RACEAMERICA or an authorized RACEAMERICA distributor. Should this product malfunction during the warranty period, RACEAMERICA will, at its option, repair or replace it at no charge, provided the product has not been subjected to misuse, abuse, or alterations, modifications, and/or repairs not authorized by RACEAMERICA.

Any product requiring Limited Warranty service during the warranty period should be returned to RACEAMERICA with proof of purchase. If return of merchandise is by mail, the customer agrees to insure the product, prepay shipping charges, and ship the product to RACEAMERICA, Inc., 280 Martin Avenue, Unit #1, Santa Clara, CA 95050, USA.

ALL EXPRESSED AND IMPLIED WARRANTIES FOR THIS PRODUCT ARE LIMITED IN DURATION TO THE ABOVE NINETY DAY PERIOD.

UNDER NO CIRCUMSTANCES WILL RACEAMERICA BE LIABLE TO THE USER FOR DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

**PACKAGE COMPONENTS**

**Model 2800P Standard Package:**

- 1 -2800 Series XL Electronics Box
- 1 -110VAC 'Christmas' Tree
- 1 - Base Plate Tree Stand w/ 1.5" Iron Pipe
- 2 -Tri-Beam Emitter (5064R/L-Start Line)
- 2 -Tri-Beam Sensor (5164R/L-Start Line)
- 2 -Interconnect Cable Assemblies for Sensors at START/STAGE/PRE-STAGE
- 1 -Starter's Pushbutton
- 1 -PC Interconnect blue serial cable 6033A - 5'
- 1 -RS422 Communication POD 4500A
- 1 -AC Adapter for POD
- 1 -07-3434 red RS422 serial cable - 100'
- 1 -XLSCORE Control and Display Software CD
- 1 -Owners Manual

Centerline Cable Option includes:

- 1 -Interconnect Cable for 60FT
- 1 -Interconnect Cable for SPEED/FINISH
- 1-Extension cable section for 1320' cabling
- 2 -IR Beam Emitters (5040A-Finish Line)
- 2 -IR Track Sensors (5140C-Finish Line)

Outside Cable Option includes:

- 2 -Interconnect Cable for 60FT
- 2 -Interconnect Cable for SPEED/FINISH
- 2-Extension cable section for 1320' cabling
- 1 -IR Beam Emitter (5042A-Finish Line)
- 2 -IR Track Sensors (5140C-Finish Line)

**Model 2800P Available Options:**

Cabling Options:

- Centerline 330'/500'/660'/1320'
- Outside 330'/500'/660'/1320'

Speed Detection: (MPH or KPH)

- Centerline Cable option
  - 2 -IR Beam Emitters (5040A)
  - 2 -IR Track Sensors (5140C)
- Outside Cable option
  - 1 -IR Beam Emitter (5042A)
  - 2 -IR Track Sensors (5140C)

60ft Intermediate ET:

- Centerline Cable option
  - 2 -IR Beam Emitters (5040A)
  - 2 -IR Track Sensors (5140C)

Outside Cable option

- 1 -IR Beam Emitter (5042A)
- 2 -IR Track Sensors (5140C)
- 5040D IR Beam Emitter (4xD-size) (for Centerline cable options)
- 6038S Timeslip Printer Package
- 6042A Thermal Printer Package
- 7540A Foam Stands
- 6828A Single Line Scoreboard
- 6810A Dual Line Scoreboard

**LOCAL REQUIREMENTS**

Additional items required to operate the standard 2800 Series timing system package:

- 1 -110VAC 20Amp circuit - Properly wired and all outlets used by system components in the same phase (See page 6)
- 4 -AA-size batteries per Beam Emitter (1 or 2)
- 4 -D-size batteries per Tri-Beam Emitter (2)
- 1 -PC or Laptop with CD Drive
  - Pentium 100 mhz or better, 64 Mb RAM
  - Color Monitor suggested
  - Minimum one 9-pin Serial Port
- 8 - 60W 110VAC Stage/Pre-Stage Bulbs
- 20 - 100 W 110VAC Floodlights (12 Yellow, 4 Green, 4 Red)

Extension Cords for AC power (if needed):

- 50' - 12 Gauge wire with ground
- 100' - 8 Gauge wire with ground
- 200' - 6 Gauge wire with ground

## PRODUCT SPECIFICATIONS

The following listing provides the designed performance specifications for the 2800 Series timing systems:

Lane Width	to 50 Feet
ET Timer Capacity	up to 90.000 sec
Speed Capacity	up to 999.99
RT Timer Capacity	up to 9.999 sec
Time Accuracy	0.001 seconds
Speed Accuracy	0.01 mph or km/h

### Power Requirements:

Tree/system	110 VAC
IR Beam Emitter	AA-size Batteries
Tri-Beam Emitter	D-size Batteries

## THEORY OF OPERATION

The 2800 Series XL Professional Drag Timing System is a completely self contained race timing system made with the latest technology CMOS circuit components to provide a highly accurate drag timing solution. The system contains an internal quartz crystal clock for time accuracy and display of race results to one thousandth of a second.

Power is supplied to the tree and track sensor components of the 2800P by the 110VAC power supplied at the 'Christmas' Tree.

The Beam Emitters and Track Sensors operate on invisible (to the unaided human eye) Infra Red light. The coded light frequencies are constantly received by the Track Sensors until a car interrupts reception ('breaks' the beam).

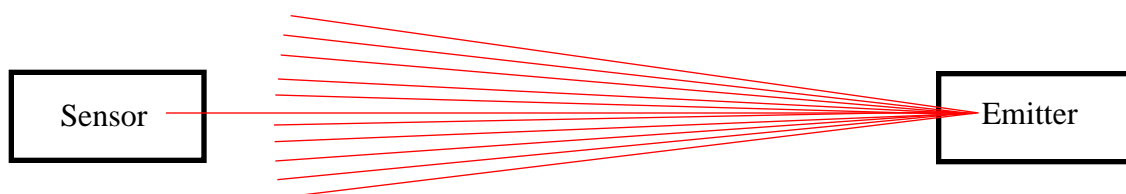
The IR Beam Emitter to Track Sensor transmission operates on Line-of-Sight principles. This makes alignment of these units critical. Tips are provided to aid alignment on surfaces that are

other than ideal and flat. These units will operate over a wide range of conditions but should not be operated beyond the specification parameters (less than 4 ft or more than 50 ft).

Once the system is properly set up and aligned on the racing surface, the system microprocessor will 'monitor' the track sensor each time the tree is started and a run is made.

Accuracy of the speed detection is closely related to the placement accuracy of the Speed Trap emitters and sensors. The distance from the finish line to the speed trap Emitter/Sensor pairs must be exactly 66 feet. A three inch placement error will cause a 0.1 MPH error in the speed measurement at 100 MPH.

In preparation for a typical run, the Starting Sequence is selected and for Index or Bracket racing, the drivers times are entered before the race. Each lane is staged by interruption of the beam signal between the PRE-STAGE and STAGE Emitters and the PRE-STAGE and STAGE Sensors by the drag vehicle. Note illuminating the staging lights is not required to begin a race. Once staged the countdown starting sequence is started by the PC running the XLSCORE Software. The driver starts on the GREEN light signal for their particular lane. The system begins timing the drivers reaction time when the last Yellow is illuminated. Reaction time is stopped once the car interrupts or "Breaks" the START beam. As the car progresses down the track, breaking the optional 60FT beams ends the 60FT ET timing process. Breaking the optional Speed Detection beams starts the speed detection process. Breaking the Finish Line beams ends the speed detection and the vehicle's ET for that run. Fouls are indicated for each lane if the vehicle interrupts the beam between the START Beam Emitter and the START Sensor prior to the illumination of the GREEN light.



The Emitter throws a spot light like beam of infra-red light; the Sensor should be aligned near the center of the beam for optimal reception and alignment. 5

## SET-UP STEPS - 2800 SERIES

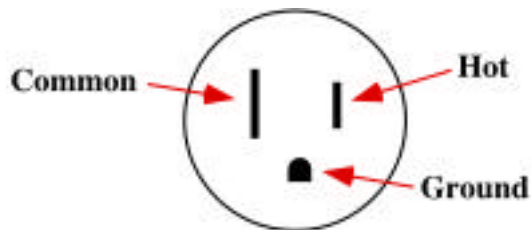
### STEP 1 - 110VAC POWER OUTLETS

Severe damage to the timing system and peripheral devices can result if the AC power outlets and extension cord wiring is improperly wired or out of phase!

To insure correct AC power installation and operation, all electrical outlets and extension cords used with the timing system and peripheral devices (PC, Printer, Scoreboards) should be checked before power is applied to the system. All electrical outlets and extension cords should be wired correctly and using the same leg (same 110VAC phase) of incoming power.

A qualified electrician should use the following diagrams to confirm proper wiring and phase of all electrical outlets and extension cords.

#### -- Proper Wiring



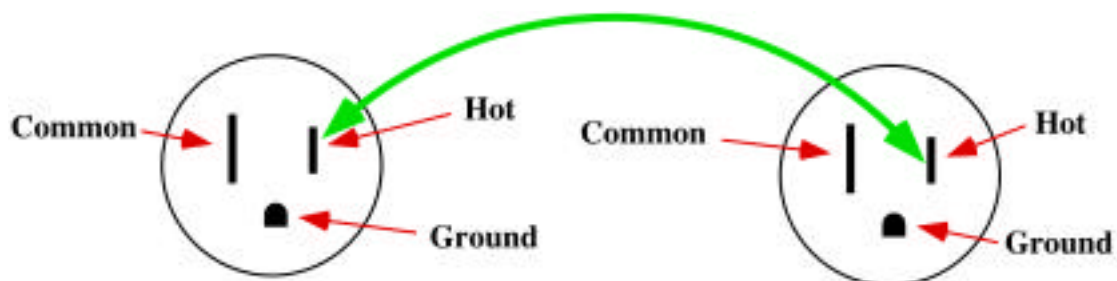
AC Voltage Check - use voltmeter capable of measuring AC voltage

Between Common and Hot - 110 VAC  
 Between Common and Ground - 0 VAC  
 Between Hot and Ground - 110 VAC

Typical Grounded Electrical Plug

#### -- Proper Phase

All devices connected to the timing system must be on the same phase of the AC cycle - in phase - before power is applied!



AC Voltage Check - use volt meter which can measure AC voltage

Between Hot and Hot - 220+ VAC - OUT OF PHASE  
 Between Hot and Hot - 0 VAC - IN PHASE

**STEP 2 -**

Familiarize yourself with the components pictured in this manual and how they interconnect. The 60FT, Speed, and Finish IR (infra-red) Sensors are model 5140C while the IR Beam Emitters at these locations are model 5040A, 5042A or optional 5040D. The starting line contains 5164L and 5164R Tri-Beam IR Sensors and 5064L and 5064R Tri-Beam IR Beam Emitters.

The Tree contains a module referred to in this manual as the Tree Electronics. The enclosure containing the timing and control electronics is the XL Electronics Box.

The base system ships with four cables, the longer cable is the Sensor Interconnect Cable which consists of two or three interconnecting cables with round connectors. The 50 ft cable with round four conductor connectors on both ends is the Tree Interconnect Cable, The two 10 ft cables with the 8-conductor RJ45 connector on one end and a 6-conductor RJ11 connector on the other end are the Tri-Beam Sensor Interconnect Cables.

All connectors are labeled for proper orientation, if required.

The free standing, battery powered Model 5040A, 5040D, 5064L/R IR Beam Emitters are placed on the outside of the race surface at the 60ft line, speed line, and finish line and the Model 5140C, 5164L/R IR Track Sensors are placed between the lanes at the 60ft line, speed line, and finish line for each lane. Each of the 5040A/D Beam Emitter or 5140C Track Sensor units are fully interchangeable with each other. The Track Sensor Interconnect Cable is labeled to match the right and left at the 60 Ft, Speed, and Finish line track sensors, positions are identified at the track sensor end of the cable. This cable consists of two or three cables, all with round connectors.

The Tree is assembled as shown with the pipe clamp and then screwed into the threaded flange on the Base Plate. Bulbs can be screwed into the sockets once the Tree is assembled and standing upright. Additional base plates can be screwed together to add weight and increase stability in windy racing environments.

**Model 5040A/5042A - IR Beam Emitter**

Note On/Off switch and placement for four AA batteries for each Beam Emitter. The 5040A emits a single beam out one side; the 5042A emits a beam out each side - intended for center of track locations.

**Model 5140C - IR Track Sensor**

Note cable connector is located in the side facing away from the track. All Track Sensor are fully interchangeable with one another. Track Sensor is pictured bottom side up.

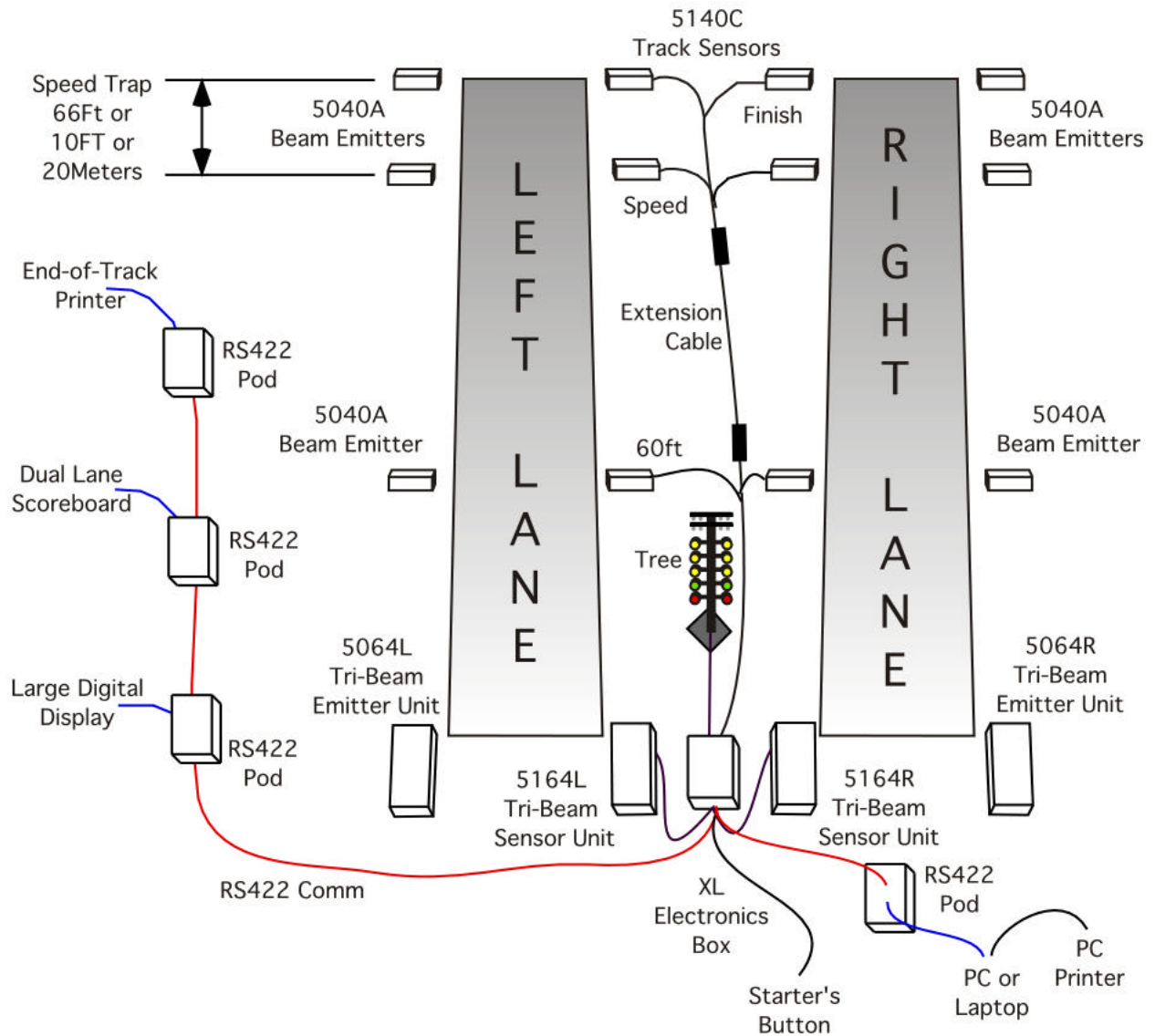
**Model 5064L/R - Tri-Beam Emitter**

All emitter units are powered from the same 'D' battery source. Note left/right orientation.

**Model 5164L/R - Tri-Beam Sensor**

All sensor units are powered from the console. Note left/right orientation.

## CABLING DIAGRAM AND EQUIPMENT PLACEMENT

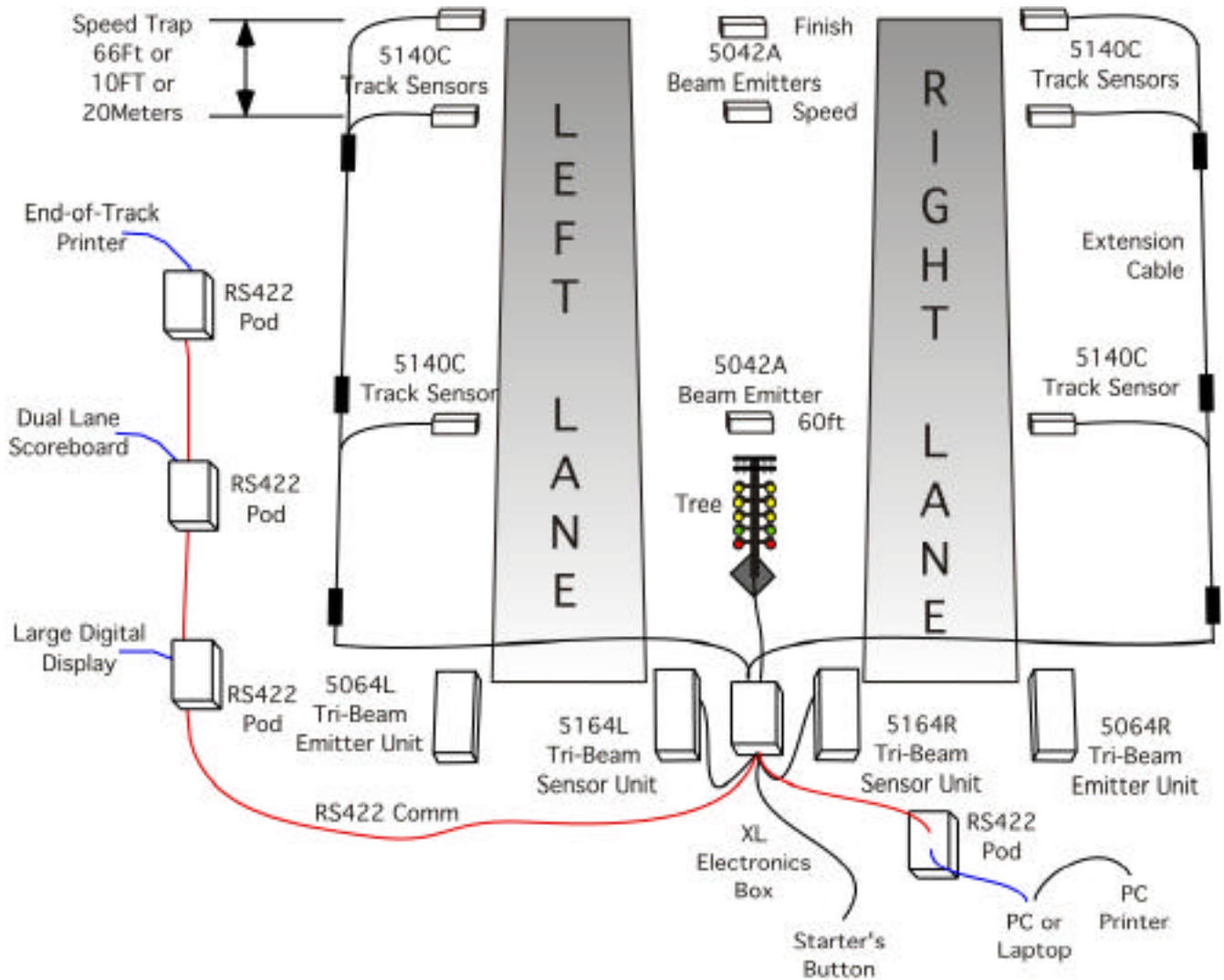


### Centerline Sensor Cables

Cable diagram showing options available with XL System. Additional PCs can be utilized over ethernet networks or with RS422 communications.



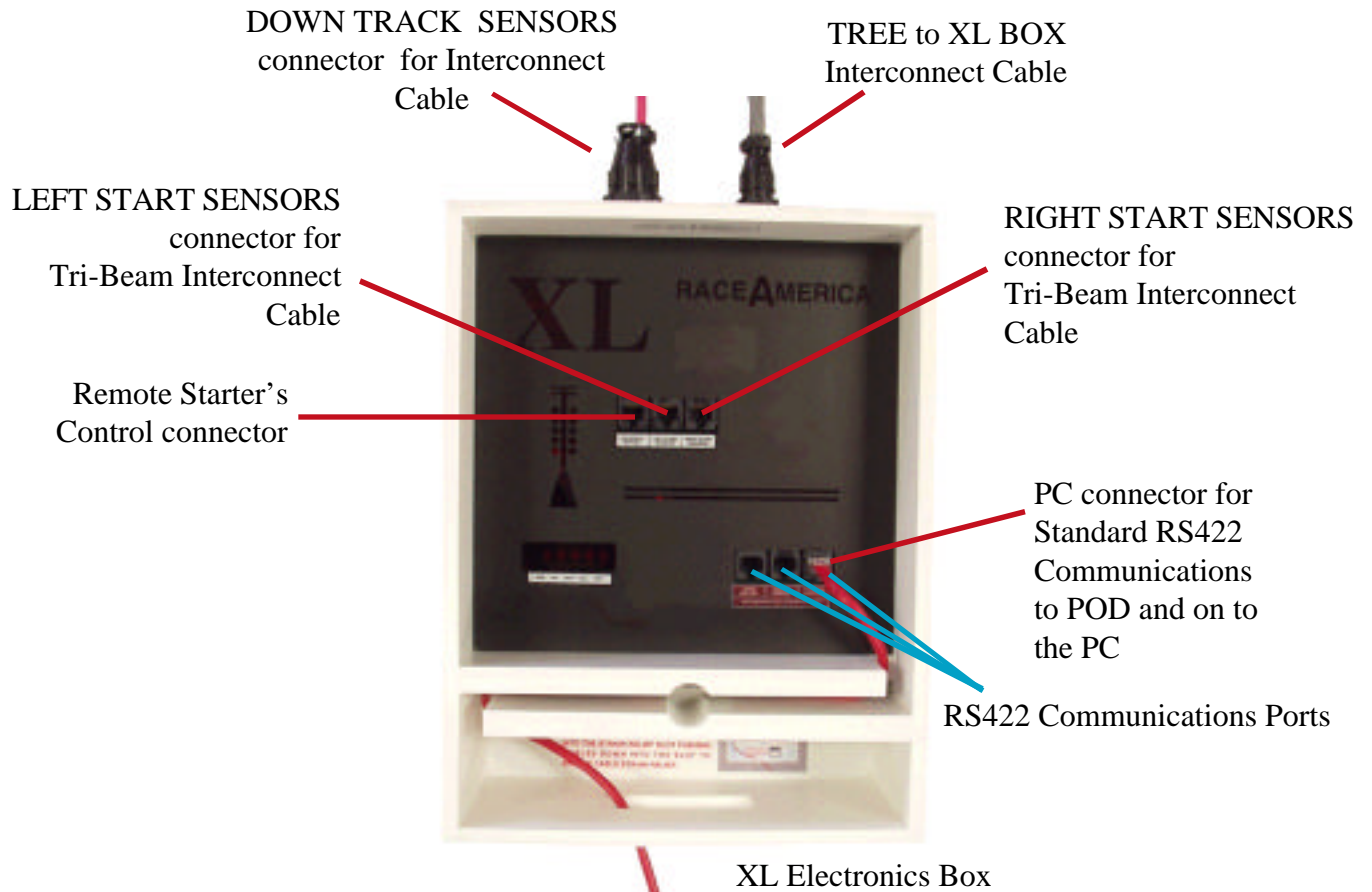
## CABLING DIAGRAM AND EQUIPMENT PLACEMENT



### Outside Sensor Cables - Tri-Beam Emitters

Cable diagram showing options available with XL System. Additional PCs can be utilized over ethernet networks or with RS422 communications.

## WIRING AND CONNECTOR DEFINITION



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## TREE CLAMP ASSEMBLY



The iron pipe is held in place by two clamps at the base of the tree. Assembly is easy if the pipe is inserted into the base of the tree with the tree sitting face up horizontally. Push up the clamp from the bottom to allow the pipe to go through each of the two clamps; a Stop bolt is in place to limit the pipe travel.



The iron pipe clamps from the back side - the nuts should be tightened to a little more than finger tight to hold the tree adequately in the vertical orientation.



**Assembled Tree and Base Plate**

The assembled Tree - note the base orientation is at a 45 degree angle to the tree for increased stability.

Multiple base plates can be screwed together to increase stability if required for windy environments.

**STEP 3-**

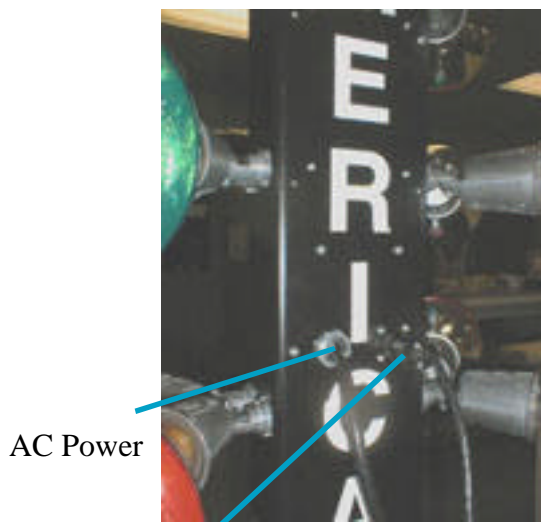
Identify the emitter/sensor placement at the start line, 60 foot, speed trap line, and finish line using the Cabling Diagram for your track. The lane width should be set at a maximum of fifty(50) feet. The XL Electronics Box is placed between the left and right Tri-Beam IR Sensors at the starting line. To help in determining initial Beam Emitter to Track Sensor alignment in larger track widths, eyeball a straight line between units or use a string stretched between the Beam Emitter and Track Sensor. The speed trap line for Mile per Hour measurements is located 66 feet before the finish line for NHRA 1/4 mile drag racing. For other drag racing programs with track lengths shorter than 500 feet, the speed trap is designed to be 10 feet before the finish line. The speed trap line for Kilometers per Hour measurements is located 20 meters before the finish line.

For all fullsize applications, the Pre-Stage/ Stage/Start beams have dedicated beam emitters spaced at standard NHRA distances of 7 inches pre-stage to stage and 16 inches stage to start/guard beam.

**STEP 4 -**

There are three main cables connecting the XL Electronics Box and the IR Track Sensors at 60FT, speed, and finish lines for a standard 1320ft track. One cable connects the XL Electronics Box at the start line with the 60FT sensors and ends approximately midtrack. The second cable is the Extension cable which adds 660 feet of length and ends near the speed line. The third cable connects the speed and finish line sensors to the other two cables. Layout the long Track Sensor Interconnect Cables on the track site as illustrated on the appropriate cabling diagram. The round connector connects to the XL Electronics Box and the smaller connectors (RJ11) connect to the Track Sensors at the 60foot, the speed and finish line as indicated on the cable near the RJ11 connector.

The 10 ft Tri-Beam Interconnect Cables connect between the XL Electronics Box and the 5154R and 5154L Tri-Beam Sensor units. These cables connect into the LEFT START SENSORS and RIGHT START SENSORS jacks in the XL



Tree Interconnect Cable

The Tree as seen from the back; do not connect the AC power until all cables have been connected and the system is ready for power up.

Electronics Box.

**STEP 5 -**

Connect cables to the XL Electronics Box by routing the cables through the access hole in the side of the unit as shown in the illustration below. Cables are then plugged in and the cables are shaped into the cable strain relief groove and pushed down into the groove. This enables a passive strain relief on the cables and allows the cover to fit properly over the unit.

**STEP 6 -**

Connect the RS232 blue PC cable to the RS422 Communications POD (4500A) at the blue port marked RS232; connect the 9-pin connector to the serial port of the laptop or PC to be used to control the XL Timing System. Connect the XL Electronics Box to the POD with a 07-3434 red cable at the connector marked PERSONAL COMPUTER under SERIAL RS422 COMMUNICATIONS (XL Box) and at the red POD RS422 connector. Route the 07-3434 cable into the XL Electronics Box the same as other cables above.



**XL Electronics Box Connection**

Cables are connected to the XL Electronics Box by routing through the access hole and plugging in the connector, then shaping the cable into the integrated cable strain relief groove.

**STEP 7 -**

Connect the Tree Interconnect cable to the XL Electronics Box outside connector marked TREE and to the round connector on the TREE.

**STEP 8 -** Connect the AC power cord to a 20A 110VAC line. A surge suppression strip is strongly recommended to minimize line loading.

See notes regarding use of extension cords and assurance of proper wiring and proper outlet phase (pages 4 and 6).

**STEP 9 -**

Connect the Starter's Button to the XL Electronics Box connector marked STARTER'S KEYPAD. This button allows starting of the tree on the track between the vehicles.

**STEP 10 -**

Final alignment of all Emitter/Sensor pairs is accomplished after the timing system is powered up, completion of the tree self-test, and the XLSCORE PC Software is loaded and running in the PC. This step is covered in detail under the next section titled **SYSTEM POWER-UP**.

**NOTE:** When using timing equipment in areas with high electrical and radio interference or for longer track lengths, shielded cabling is strongly recommended to insure proper operation and accuracy. Shielded cabling is supplied with the timing system and a single conductor wire is present at the XL Electronics Box marked 'External Ground Connection'. When electrical interference is at very high levels, it may be necessary to connect the supplied external ground wire to a water pipe or metal stake installed into the earth ground. Very high electrical interference will cause the alignment of the emitter/sensor pairs to appear to randomly go in and out of alignment even when the sensor and emitter pair are aligned at close distances.



## SYSTEM POWER-UP

### STEP 1 - POWER-ON SELF-TEST

Turn the power on at each IR BEam Emitter and Tri-Beam emitter. **Verify all AC power is connected as shown on page 6 (have a qualified electrician verify the wiring if necessary - severe damage to the system can occur if the wiring is not correct).** Turn on the AC power to the system. Each time power is applied to the timing system, a self-test sequence is initiated by the microprocessor to insure proper operation of the display and electronics. To insure all visual components are operational, the following sequence should be observed:

#### Light Tree:

Each light on the left side will illuminate in sequence starting from the bottom RED light up through the staging lights will illuminate in sequence starting from the bottom RED light up through the staging lights.

Both lanes will sequence together starting with the staging lights down through the RED lights.

All lights will illuminate in sequence starting from the bottom left up to staging then the bottom right up to staging. The speed of the test will be at 2 times the previous sequence.

All lights will go out in sequence starting with the bottom left up to the staging then the bottom right up to staging. Rate of change will remain at 2 times.

All lights will then flash off and on, then turn off (as long as the Tri-Beam Emitters have been powered on).

Visually inspect the Light Tree for proper operation. All other circuitry is internally tested by the microprocessor. Upon completion of the self-test, the timing system will be ready for use with all tree lamps off and the Stage, PreStage, and Redlight lamps active when the respective

beam is blocked at the starting line. If an error occurs, the timing system will not respond or the sequence above will not start or follow to completion.

### STEP 2 - LOAD THE XLSCORE PC S/W

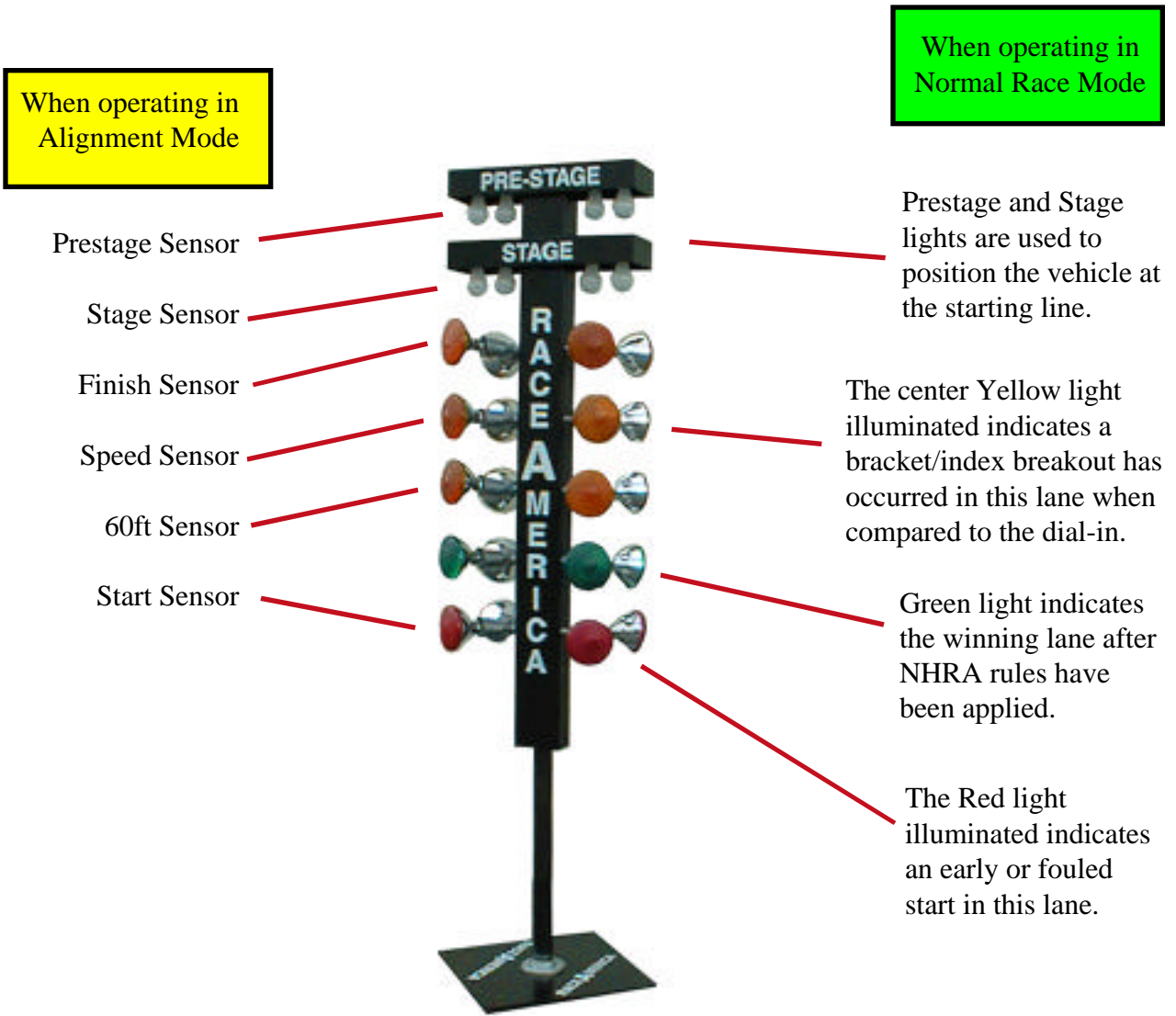
The XL Timing System is controlled by software programs running in a Windows operating system PC or Laptop computer. Insert the **XLSCORE** Control and Display Software CD into the PC and copy the following three files to a desired directory on the hard drive of the PC. Insure all three files reside in the same directory or the software will not function properly. No PC restart is required to use this software after loading. The files to copy are named:

```
xlscore.exe
commport.dll
fileio.dll
```

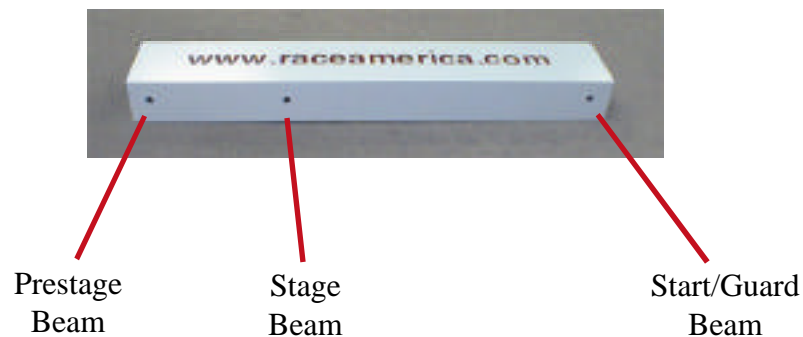
NOTE: The Windows operating system running in the PC may be configured to display a subset of the files in a directory. These OS settings may not display the .dll files in a directory and appear as if only one file exists. If the OS is configured in this manner, it must be reconfigured to view all three files and copy them to the hard drive, however, this reconfiguration is not required to run the XLSCORE software.

Run the xlscore.exe file to begin the XLSCORE software. Refer to the XLSCORE Owner's Manual for operation of the software, alignment of the timing system, configuration of the printer, and storage of race results.

## TREE FUNCTIONALITY DESCRIPTION



Tri-Beam Sensor



## **MAINTENANCE**

The 2800 Series Electronics, Beam Emitters, and Track Sensors do not require any maintenance beyond normal cleaning to insure good electrical connection and optical performance of the infrared beams.

To insure uninterrupted operation on raceday, it is suggested to keep track of battery usage hours so as to have fully charged batteries. Plan to replace the alkaline AA cells in the Beam Emitters after about 60 hours use. If you are using rechargeable AA cells, recharge them each day. Low battery voltage (Emitters below 4.5V DC) will cause intermittent operation of the system resulting in intermittent cars detected at the starting line or the finish line as the batteries power weakens.

To maintain the highest level of timing accuracy and minimize false trips, annual preventative maintenance and calibration should be performed on all system track sensors and beam emitter units.

## **SPARE PARTS**

Further to minimize race program interruptions, RACEAMERICA recommends some spare parts. A spare emitter/sensor pair and end of track cable sections should be available in the event of an unfortunate accident during a program. Contact RACEAMERICA for availability and pricing of spares items.

## **SUPPORT AGREEMENTS**

Support agreements are available from RACEAMERICA providing Telephone Assistance on technical issues and operational questions, repair and/or replacement of hardware failures, Software and Firmware updates and bug reporting, and Annual Preventative Maintenance on all system track sensors and beam emitter units. Contact RACEAMERICA for more information and pricing of Support Agreements.